TB206510W

Reg. No :...............................

Name :..................................

DEGREE (C.B.C.S.S) EXAMINATION, APRIL 2023

(2018 Admission Regular)

SEMESTER VI - CHOICE BASED CORE

MT6B13AB18 - OPERATIONS RESEARCH

Time : 3 Hours **Maximum Marks : 80**

Part A

I. Answer any Ten questions. Each question carries 2 marks **(10x2=20)**

1. In a linear programming problem, all relationships among decision variables are ____________
2. Define Basic Variables
3. If any value in the X_B column of final Simplex table is negative, then the solution is _______________
4. The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients A and B . A costs Rs. 5 per kg and B costs Rs. 8 per kg. Strength considerations dictate that the brick should contain not more than 4 kg of A and a minimum of 2 kg of B. The demand for each product is likely to be related to the price of the brick. Formulate the problem as an LP model.
5. Write the following LPP in standard form
   Min $Z = 2x_1+x_2+4x_3$
   subject to $-2x_1+4x_2 \leq 4$
   $x_1+2x_2+x_3 \geq 5$
   $2x_1+3x_3 \leq 2$, $x_1 \geq 0, x_2 \geq 0$, x_3 unrestricted in sign
6. Write the dual of the LPP Minimize f(X)=CX subject to the constraints $AX \geq B$, $X \geq 0$
7. Define Transportation Problem
8. Define unbalanced Transportation Problem
9. Define non-degenerate basic feasible solution with reference to a Transportation Problem
10. Obtain an initial basic feasible solution to the given LP problem using Least cost method

	D1	**D2**	**D3**	**Supply**
O1	1	7	3	100
O2	4	2	9	100
Demand	75	85	40	

11. Define the value of the game.
12. Define minimax principle.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Compare the two methods for finding the solution of an LPP graphically
14. Use Simplex method to solve the LPP
    Max $Z= 3x_1+2x_2$
    subject to the constraints
    $x_1+x_2 \leq 4$
    $x_1-x_2 \leq 2$, $x_1, x_2 \geq 0$

15. Use Simplex method to solve the LPP
    Maximize Z = $x_1+x_2+3x_3$
    subject to the constraints
    $3x_1+2x_2+x_3 \leq 3$
    $2x_1+x_2+2x_3 \leq 2$, $x_1, x_2 , x_3 \geq 0$
16. Solve the LPP graphically using iso-profit function line method
    Max Z =$15x_1+10x_2$
    subject to the constraints
    $4x_1+6x_2 \leq 360$
    $3x_1 \leq 180$
    $5x_2 \leq 200$ $x_1, x_2 \geq 0$
17. State and prove Complementary Slackness Theorem
18. Write the Dual of the following LP problem
    Maximize Z = $3x_1+x_2+2x_3-x_4$
    subject to the constraints
    $2x_1-x_2+3x_3+x_4=1$
    $x_1+x_2-x_3+x_4=3$ $x_1, x_2 \geq 0$ and x_3, x_4 unrestricted in sign
19. Write the Dual of Transportation model
20. Determine an initial basic feasible solution to the following Transportation problem using North-West corner rule

	D1	D2	D3	Supply
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Demand	7	9	18	

21. State the rules of dominance.

Part C

III. Answer any Two questions. Each question carries 15 marks **(2x15=30)**

22. Use Big M method to solve the LPP
    Minimize Z = $4x_1+3x_2$
    subject to the constraints
    $2x_1+x_2 \geq 10$
    $-3x_1+2x_2 \leq 6$
    $x_1+x_2 \geq 6$ $x_1 \geq 0, x_2 \geq 0$
23. Solve the following transportation problem with initial solution obtained by Vogel's Approximation method

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

24. Solve the following transportation problem

	D1	D2	D3	D4	Supply
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
Demand	200	225	275	250	

25. For the following payoff matrix, transform the zero-sum game into an equivalent linear programming problem and solve it by using the simplex method

	Player B		
Player A	B1	B2	B3
A1	1	-1	3
A2	3	5	-3
A3	6	2	-2